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Changes in Industrial Concentration in the Croatian Economy (1995-2006)



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Abstract

The aim of this paper is to obtain a better understanding of differences and dynamics of concentration across various industries in the Croatian economy in the period 1995-2006 in order to be able to foresee future trends. Shifts in concentration vary across industries in the Croatian economy. Concentration declines in approximately two fifths of the Croatian economy whereas one fifth of the Croatian economy shows a growing trend in concentration. In the remaining industries no changes in concentration occurred. The causes of concentration are as follows: (1) decline in concentration due to inadequate adjustments of leading firms to transition, (2) decline in concentration due to deregulation, (3) increase in concentration in industries targeted by multinational companies, and (4) increase in concentration in industries in which no significant new firms emerged following the unsuccessful privatization of leading firms.

Keywords

concentration, industry, transition

JEL classification

L12, L13, L16

1. Introduction

Concentration is an economic term with multiple meanings, but it always refers to the idea of control exerted by an economic entity over economic resources or industries. Thus defined, concentration exists when a proportionally small segment of economic entities exert control over a proportionally large segment of all available resources.

Industrial concentration is mainly defined by the number of firms and their respective shares in an industry (Bain, 1968). Industries with a high degree of concentration have a small number of firms which control a large share of total industrial sales, whereas industries with a low level of concentration have a large number of relatively small firms whose share in total industrial sales is small.

The level of concentration is an important structural industrial variable. Many authors stress concentration as an important factor when explaining why various industries are more or less effective. Namely, increasing the firm size, which is a precondition for high industrial concentration, may boost competitive capacity and strengthen the market position because long term average costs may decrease, and various strategic, operative, financial and other synergic effects may occur. Similarly, increased firm size may lead to strengthening research and development functions, improving production and logistics potential and improving the quality of human resources.

Although high industrial concentration may yield economic benefits, excessively high industrial concentration may present a threat to the interests of markets, competitiveness, consumers and the public, in fact to society as a whole. It is a widely spread belief that in highly concentrated markets competition among firms will decline because the existence of very dominant firms in the market is known to limit the freedom of competition, foster collusive behavior (tacit agreements), and lead to negative effects of strong market power primarily by preventing the formation of an acceptable market price and by reducing the optimal size of output.¹

Empirical research of industrial concentration is abundant in international literature. It investigates industrial concentration in different industries as well as analyses the relationship between concentration and some other economic variable, especially profitability.

The profit potential of an industry, and all the firms within it, depends on exogenous and endogenous factors. Fundamental economic features of an industry, primarily the price elasticity of products as well as production technology influence the profit potential of all industrial firms as a predominantly (but not exclusively) exogenous variable, whereas industrial structure (primarily its concentration) as well as corporate strategies influence the profit potential of an industry as a predominantly endogenous variable.²

Research conducted in different periods and in different industries shows there is a more or less strict rule regarding the relationship between the level of concentration and industrial profitability (e.g. Bain, 1951, 1956; Mann 1966; Weiss, 1974; Dufwenberg et al., 2000; Sen, 2003). It seems that high concentration is related to high industrial profits (especially above some critical level of concentration), even when significant industrial barriers to entry exist. Firms from concentrated industries report, on average, higher income than firms in non-concentrated industries, although the reasons for that may vary (e.g. Mueller et al., 1998; Shughart II 1990, DeJonghe et al., 2008). Apart from market power as a source of differences in profitability in more or less concentrated industries, the Chicago School scholars stressed that a different level of profit, size and market success were primarily the result of differences in firms' efficiencies and capabilities (Stigler, 1964, 1968). Thus, high profit rates achieved by large firms in concentrated industries

¹ High concentration may be a natural result of the market mechanism if there is no freedom to enter the market, if there is a threat of newcomers and if the level of minimal optimal scale firm is high. Even in conditions of interaction of several big firms, market is a mechanism which allows current successful and potential competitors to conquer unsuccessful firms if these firms maintain their acquired position at high costs and high profits unacceptable by the market.

² Structure-conduct- performance paradigm, for long time a leading theoretical framework in industry organization, presupposed only a limited number of key differences between firms: size, product differentiation and vertical integration. Key differences between firms were related to market share and industrial concentration. (Bain, 1968)

were primarily the result of economic efficiency or the fact that prices do not fall as rapidly as unit costs, and not an expression of market power (Brozen 1971, McGee 1971, Demsetz 1973, Peltzman 1977).³

Since a systematic study of concentration across Croatian industries does not exist, the main objective of this paper is (1) to determine the level of concentration of the Croatian economy across divisions of NACE Rev 1 classification in the period 1995-2006. This would lay grounds for further research of industrial concentration with other economic variables in the Croatian economy.

Furthermore, this paper also aims to: (2) measure the level and investigate the direction of shifts in concentration across divisions of the Croatian economy, (3) examine if there is a relationship between the direction of shifts in concentration and the level of concentration, and (3) investigate future trends in concentration in the Croatian economy.

2. Industrial concentration in countries in transition

Numerous research studies dealing with industrial concentration have been conducted in European countries in transition in the last fifteen years.

For instance, Newbery and Kattuman (1992) investigated concentration and competitiveness in selected countries of Eastern Europe (East Germany, Czechoslovakia, Poland). Centrally planned economies of these countries were characterized by the existence of big enterprises which dominated certain industries, whereas medium-scale and small-scale enterprises had a marginal impact as a group. The breakup of the Soviet Union in 1989 triggered a wave of privatization and restructuring of big enterprises (Roberts, 2000). The process of restructuring of big enterprises was most commonly initiated because of external pressure in the form of strong competition, and as a rule, it was implemented with the help of the state. Needless to say that restructuring often provoked opposition among workers because of consequent job cuts. All this contributed to the decrease in concentration and increase in competitiveness of East European countries, accompanied by the development of distribution of firms according to size corresponding to the free market economy.

Furthermore, the study conducted by Uncovsky (1994) also yielded interesting results. The author argues that in Slovakia there are tendencies in deconcentration connected with transition to the market economy. High concentration of the Slovak industry results from the adjustment of the firm size to the former requirements of the Czech economy and administrative planning methods.

Another study worth mentioning is that of Maryanchyk (2006) which explores the impact of concentration and competitiveness on the profitability of firms in Ukraine in the period of transition.

Other interesting studies include research of concentration in selected industries in particular countries in transition. For instance, Sadowski (2000) discusses the impact of competitors from the countries of West Europe on the telecommunications market in Poland, Hungary and Czech Republic, while Grandys (2005) analyses the characteristics of textiles and clothing markets in Poland. Their findings mainly reveal a decrease in industrial concentration. Furthermore, concentration of the banking industry is the subject of recent research study which shows a close relationship between competitiveness, concentration and efficiency of banks (Athanasoglou et al., 2006; Koutsomanoli- Filippaki et al., 2008).

The overview of current research findings on industrial concentration in Croatia shows that studies were conducted only partially, for particular industries or groups of industries, or they did not take into account

³ All research findings have not confirmed the link between industry concentration (and firm size) and profitability. One example is Schmalensee (1988), who found that the link between industrial concentration and profitability is weak, and the same was true of the estimated concentration effect.

changes in concentration in the long run. There are also research studies which indirectly deal with concentration as a research variable.⁴

For instance, Pervan (2007) argues that the concentration of the Croatian manufacturing industry declines in the period 1999-2004 (as measured by C4 concentration ratios of 84 three-digit industries on of the *Croatian National Classification of Economic Industries* and by using a weighted arithmetic mean to calculate average concentration). The reasons for such decline include openness to foreign markets, growing foreign investments and penetration of foreign companies in the home market. At the same time however, the author observes a growth in the share of big manufacturing firms in total industrial revenue (concentration growth indicator) which shows that the author's study needed to be complemented with other concentration indicators.

The concentration of the Croatian banking industry is analyzed in a number of research studies, for instance research studies covering the period 1992-1996 (Pejić Bach and Gogala, 1998) and 1993-2002 (Tipurić et al., 2003). The research findings showed that the Croatian banking industry in the observed period was relatively concentrated, with an unstable oligopolic structure: with two major competitors and several medium-scale banks and a falling number of small banks.

Tipurić et al. (2008) analyze concentration in the insurance market in the context of regional countries (Slovenia, the Czech Republic, Slovakia, Poland and Hungary). The authors show that the Croatian insurance industry belongs in the category of highly concentrated industries, but in which concentration nevertheless declines towards the zone of moderate concentration.

Morić Milovanović and Galetić (2006) analyze investment funds in Croatia, with special emphasis on open-end investment funds. Using the Gini coefficient, the Lorenz curve and concentration ratios they show that this industry is characterized by moderately high concentration.

Segetlija (2005) investigates the structural changes of trading companies in Croatia relative to the development of concentration in retail trade. The author shows that the development of concentration is accompanied with the tendency of vertical integration of wholesale and retail trade.

It is our purpose to systematically investigate changes in industrial concentration in the Croatian economy in the period 1995-2006, which will be discussed further in the text.

3. Methodology

Data

The data used in our analysis need to be considered within the context of scholarly attempts to define and classify industries. On the supply side, an industry consists of firms offering a range of products or services with important common production features, mainly with generically identical technologies or technological processes. On the demand side, an industry consists of a group of firms which create products or services perceived as distinct by buyers. As Bain emphasized (1968), these products and services are close substitutes to buyers, they are available to the same target buyers and are distanced (as substitutes) from all other products which are not the industry's output. In cases when the degree of differentiation of industrial products is low, an industry is characterized by high cross-price elasticity of demand.

⁴ Tipurić (2000) for instance analyzed the link between firm size and profitability on a large sample of Croatian firms (data about more than four thousand firms and their business operations over a six-year period). The results show a positive relationship between firm size and profit, as well as the existence of correlation in the increase in size (measured by total revenue) and growth in profitability. In addition, Pervan and Pavić (2005) research the relationship between levels of concentration and profitability in particular industries of the Croatian economy.

Further defining industry, it is important to say that an industry is a group of firms which are, according to several major criteria, similar and which compete against each other in the market. It is therefore necessary to take into consideration both supply and demand sides in the attempt to define industry, because, as Abell (1980) suggests, industries consist of firms which mutually share technologies and customers.

To draw a line which would set individual industries apart is more a matter of analytical experience and distinct features of each economic industry, than a matter of generally accepted, certain and undisputable definitions. In other words, it is not entirely possible to use universal and clear-cut solutions or definitions. For instance, Collis and Ghemawat (1994) argue that the ambiguity of definition of the term industry arises from: (1) the problem of determining a horizontal industrial area which is determined by markets for products produced by firms, (2) the problem of determining a vertical industrial area which is related to the value chain, the issue of scope and differentiation of the so-called vertical markets, and finally (3) the problem of determining the geographical region of an industry, i.e. those places in which the industry's output is produced and sold.

Each individual industry at each moment and in every place is therefore a certain abstraction perceived by the person who observes and analyses it. Various changes in industrial dynamics may lead to the narrowing or expanding of the industry's domain, to the inclusion of entirely new or exclusion of old competitors and even to a complete redefinition of the industry as such.

Bearing in mind the above considerations, our study necessarily relies on available statistical data and focuses on the objectives set before this research. However, the authors are cautious about the use of statistical data since exclusive orientation on solutions offered by statistical classification of industries may be erroneous if at least some defining guidelines are not respected. For instance, these defining guidelines include similarity of technological basis and strong substitutiveness of products of firms in the industry.

Although statistical classification of industries does not correspond entirely to the above-mentioned framework of definition, its value is exceptional. Scholars and analysts are able to obtain important data without conducting autonomous, in-depth and often costly empirical studies. Therefore, existing research studies often attempt to incorporate the definition of industry into the framework provided by classification, either by combining several subclasses or classes of various groups, or by attempting at additional analytics within the given framework.

To conclude, this research study will analyze industrial concentration based on *NACE Rev. 1* classification of industries at the two-digit level. For the purposes of our analysis, data on total revenue of ten largest firms in particular industries are used in the period 1995-2006, as provided by the Croatian State Financial Agency.

Measures of concentration

Our study uses concentration ratios C1, C4 and C10 which measure the share of total revenue of one, top four and ten largest firms in the total revenue of the division, as well as the Herfindahl-Hirschman index of concentration (hereinafter referred to as the HH index or HHI) which represents the sum of the squares of shares of total revenue of each particular firm in the total revenue of the division. The value of this index ranges from 0 to 10,000; it reaches its maximum value if the division consists of one firm only, and its lowest value when all firms in the division have equal market shares, i.e. when the division may be considered to be perfectly competitive. In that case the HH index is identical to the ratio between maximum value and the number of firms in the division.

In this paper the HH index is calculated on the basis of shares of total revenue of ten largest firms in the total revenue of the division, whereas other firms in the division were assumed to have equal market shares. This approach, which uses a selected number of leading firms to calculate the HH index, is common. For

instance, 50 largest firms are used in the calculation of the HH index of industries in the American economy (U.S. Census Bureau, 2003).

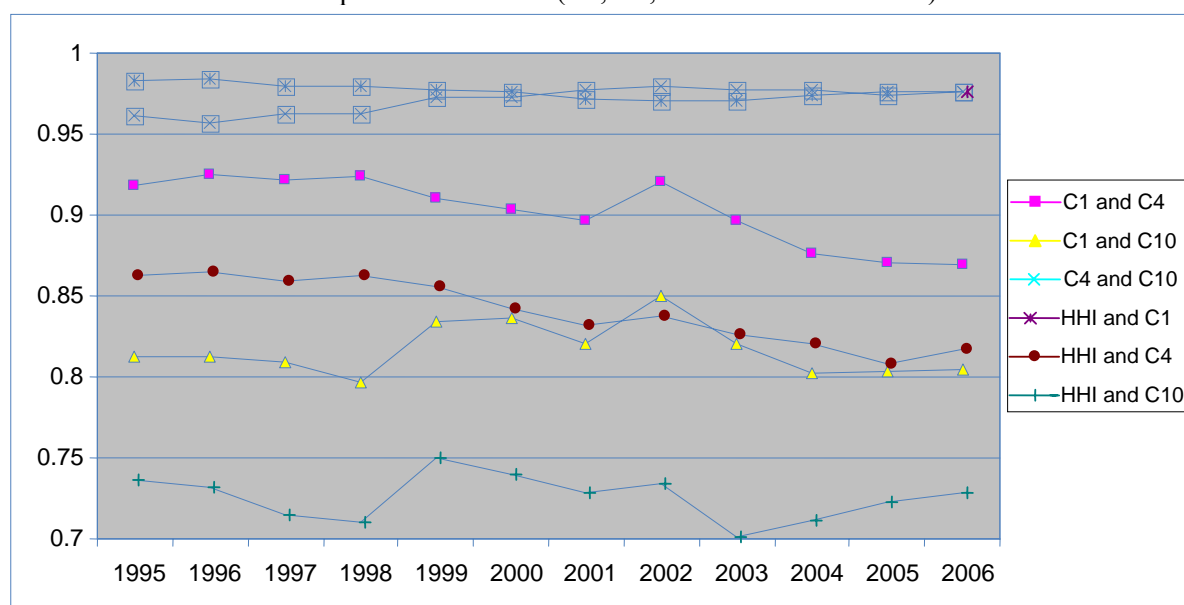
Mutual relationship between selected measures of concentration

Mutual relationship between selected measures of concentration for divisions in the Croatian economy is analyzed with the use of correlation analysis. Correlation ratios are calculated between all pairs of concentration measures to determine their relationship. Our analysis clearly shows that correlation ratios are high for all pairs of selected measures of concentration. Correlation ratios for concentration ratios C4 and C10 are especially high, as well as for the HH index and C1. However, lower values of correlation ratios are calculated for the HH index and C10, C1 and C10, and for the HH index and C4.

On the other hand, if shifts in correlation ratios among concentration ratios C1, C4 and C10 and the HH index are observed over a period of time, it is clear that they do not always move in the same direction (Figure 1). In other words, if the correlation ratio between concentration ratios C4 and C10 increases, this does not mean that the correlation ratio between the HH index and C1 will also increase.

Correlation analysis of concentration ratios C1, C4 and C10 and the HH index shows that the use of selected measures of concentration is justified, and that their analysis will shed light on the problem of concentration of the Croatian economy in more dimensions than if only one measure of concentration had been used, which confirms the findings of similar research studies (Kwoka, 1981; Amato, 1995; Hennessy et al., 2007).

Figure 1. Correlation ratios of pairs of used concentration measures in the period 1995-2006 (C1, C4, C10 and the HH index)



Evaluation of the level of concentration

The analysis of concentration of divisions will be conducted according to two criteria: the level of concentration and shifts in concentration.

The level of concentration is evaluated on the basis of values of concentration ratios C1, C4, C10, and the HH index. Divisions in which C1 ratio is higher than 20%, C4 is higher than 50% and C10 is higher than 70% are rated as highly concentrated, and the reverse is true as well. The HH index ranging from 0 to 1,000

marks the absence of monopolistic power and the division can be considered to have low concentration, while the value of the HH index ranging from 1,000 to 1,800 points to high concentration of the division. The value over 1,800 refers to high concentration of the division (Griffiths and Wall, 1996).

For the purpose of our analysis divisions with the HH index higher than 1,000 are considered as highly concentrated and vice versa.

Shifts in concentration

The direction of shifts in industrial concentration is evaluated by the method of linear trend parameter estimation. Using the method of the smallest squares, the value of linear trend equation for concentration ratios C1, C4, C10 and the HH index is obtained.

$$\hat{y}_t = \hat{\alpha} + \hat{\beta}x_t + \varepsilon_t$$

The obtained value of concentration measures through time \hat{y}_t depends on the obtained value of constant $\hat{\alpha}$, the obtained value of the linear trend coefficient $\hat{\beta}$, and random component ε .

The shifts in concentration were evaluated in the following way. When the linear trend coefficient $\hat{\beta}$ is statistically significant, concentration is considered to be rising or falling depending on the positive or negative sign of the $\hat{\beta}$ coefficient. When the $\hat{\beta}$ coefficient is not statistically significant concentration cannot be evaluated by a linear trend.

Linear trend equation was done for concentration ratios C1, C4, C10 and the HH index. Since four indicators were used, *the summary grade of the direction of the shift in concentration of the division was determined in the following way.*

Concentration rises in the divisions for which the linear trend coefficient $\hat{\beta}$ is positive and statistically significant for at least one measure of concentration. The reverse is also true, so that *concentration falls* in the divisions for which the linear trend coefficient $\hat{\beta}$ is negative and statistically significant for at least one measure of concentration. *Concentration cannot be described by a linear trend* in all other cases when the linear trend coefficient $\hat{\beta}$ is not statistically significant for all measures of concentration. In several divisions, shifts in concentration indicators are inconsistent, and the linear concentration ratio $\hat{\beta}$ is statistically significant, but it is positive for one measure and negative for another measure of concentration. Shifts in concentration in these divisions were rated as rising if the linear concentration coefficient $\hat{\beta}$ is positive and statistically significant for a number of measures of concentration. Shifts in concentration in these divisions are rated as falling if the linear concentration ratio $\hat{\beta}$ is negative and statistically significant for a number of concentration measures.

4. Study results

Level of concentration across divisions

The calculation of concentration measures across divisions for 1995 and 2006 is shown in Table 1. The shadowed boxes refer to calculated measures of concentration in the divisions where concentration ratio C1 is higher than 20%, C4 is higher than 50%, C10 is higher than 70% and the HH index is higher than 1,000. These limits divide divisions with high concentration from divisions with low concentration.

In some divisions all measures of concentration are higher than the above mentioned limits in 1995 and 2006, and these divisions can be considered highly concentrated according to all criteria, for instance division 2 – Forestry, logging, and related service industries. There are eight such divisions altogether.

On the other hand, according to some measures of concentration a number of divisions is highly concentrated and according to other measures these divisions have a low degree of concentration. For instance, Division 19 – Tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear is highly concentrated according to all measures of concentration in 2006, while it shows low concentration in 1995. There is a total of twenty one divisions of this kind.

Finally, most divisions (twenty eight) have a low degree of concentration according to all measures of concentration. One such example includes division 5 – Fishing, fish farming and related service industries.

Table 1. Measures of concentration across divisions for 1995 and 2006⁵

Industry	Division	Industry	C1	C4	C10	HHI	No. of firms					
			1995	2006	1995	2006	1995	2006	1995	2006	1995	2006
A	1	Agriculture, hunting and related service industries	6.7	9.7	19.2	25.6	35.1	38.3	145.1	218.8	1,198	1,594
A	2	Forestry, logging and related service industries	97.7	93.3	98.4	96.0	99.1	97.4	9,546.6	8713.5	50	70
B	5	Fishing, fish farming and related service industries	24.9	14.3	46.1	36.7	66.8	54.6	861.5	446.1	174	234
C	11	Extraction of crude petroleum and natural gas; service industries incidental to oil and gas extraction, excluding surveying	-	29.6	-	94.7	-	100.0	-	2,337.6	-	19
C	12	Mining of uranium and thorium ores	-	95.4	-	100.0	-	-	-	9,122.6	-	3
C	13	Mining of metal ores	-	99.4	-	100.0	-	-	-	9,871.2	-	2
C	14	Other mining and quarrying	19.4	8.3	37.8	22.3	62.0	43.0	610.0	224.4	82	200
D	15	Manufacture of food products and beverages	13.1	7.3	27.0	22.4	43.6	38.8	288.7	182.1	702	1,327
D	16	Manufacture of tobacco products	48.8	88.9	94.3	100.0	-	-	3,454.8	7,987.3	7	5
D	17	Manufacture of textiles	6.5	7.7	25.6	24.7	50.2	48.3	276.1	263.3	301	275
D	18	Manufacture of wearing apparel; dressing and dyeing of fur	8.8	21.7	26.8	42.1	42.8	53.1	241.7	691.0	560	485
D	19	Tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear	10.7	48.0	36.4	66.9	57.5	78.1	440.1	2,511.4	188	141
D	20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	4.4	5.7	13.9	15.2	26.7	25.7	86.2	89.9	637	763
D	21	Manufacture of pulp, paper and paper products	31.6	29.1	53.2	54.4	76.3	73.7	1,254.9	1,199.6	146	175
D	22	Publishing, printing and reproduction of recorded media	12.3	8.0	31.3	23.3	43.0	39.9	312.2	196.3	1398	1612
D	23	Manufacture of coke, refined petroleum products and nuclear fuel	100.0	96.0	100.0	99.9	-	-	10,000.0	9,226.6	2	11

⁵ Measures pointing to high concentration are shadowed in grey.

D	24	Manufacture of chemicals and chemical products	28.3	25.7	69.5	60.6	82.8	78.4	1,519.3	1,181.7	245	258
D	25	Manufacture of rubber and plastic products	8.0	12.1	23.6	21.5	46.7	36.1	243.6	219.6	491	597
D	26	Manufacture of other non-metallic mineral products	12.1	10.5	32.2	26.9	48.2	41.4	349.9	244.5	317	542
D	27	Manufacture of basic metals	19.7	23.1	51.2	59.9	80.0	79.8	941.6	1,235.1	84	110
D	28	Manufacture of fabricated metal products, except machinery and equipment	3.7	3.8	11.2	12.0	21.2	22.1	54.3	58.1	1,281	1,592
D	29	Manufacture of machinery and equipment n.e.c.	4.6	8.0	17.3	20.3	33.8	35.8	133.1	167.1	390	569
D	30	Manufacture of office machinery and computers	6.0	38.8	19.4	57.5	38.7	73.0	170.6	1,684.3	363	280
D	31	Manufacture of electrical machinery and apparatus n.e.c.	17.9	22.9	40.3	43.2	57.4	62.7	546.3	744.1	431	352
D	32	Manufacture of radio, television and communication equipment and apparatus	72.9	58.2	81.1	85.1	86.9	90.9	5,345.6	3,733.4	200	149
D	33	Manufacture of medical, precision and optical instruments, watches and clocks	8.6	10.1	26.3	31.6	44.3	42.6	253.5	298.3	238	300
D	34	Manufacture of motor vehicles, trailers and semi-trailers	25.4	32.8	58.8	71.1	84.4	88.0	1,181.9	1,778.2	62	65
D	35	Manufacture of other transport equipment	19.0	22.8	53.9	62.0	75.2	81.7	888.1	1,147.5	159	360
D	36	Manufacture of furniture, manufacturing n.e.c.	8.9	7.0	30.1	23.4	47.7	40.5	291.1	198.2	460	632
D	37	Recycling	13.4	24.8	47.3	48.4	67.9	68.3	659.5	903.2	104	138
E	40	Electricity, gas, steam and hot water supply	88.4	47.1	94.9	82.3	97.9	94.6	7,838.8	2,751.2	28	81
E	41	Collection, purification and distribution of water	8.1	13.8	26.6	30.9	49.8	48.1	309.2	371.9	80	109
F	45	Construction	6.4	3.3	13.2	11.0	21.4	21.2	70.4	49.5	4,579	8,132
G	50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	5.4	8.1	20.2	25.3	34.7	37.4	148.7	197.0	1,413	2,406
G	51	Wholesale trade and commission trade, except of motor vehicles and motorcycles	2.2	2.0	6.0	7.2	10.3	14.4	13.2	22.3	20,232	16,348
G	52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	5.8	14.9	15.9	23.6	23.0	33.1	81.2	262.8	8,760	8,621
H	55	Hotels and restaurants	5.2	3.7	16.3	13.3	27.3	22.4	93.3	60.1	1,954	3,817
I	60	Land transport; transport via pipelines	36.5	25.7	54.1	41.0	62.9	50.4	1,462.4	803.6	1,873	2,125
I	61	Water transport	33.8	30.1	70.4	80.4	98.5	93.8	1,842.2	1,935.0	44	195
I	62	Air transport	98.1	80.4	99.8	98.6	100.0	99.7	9,626.1	6,677.3	17	30
I	63	Supporting and auxiliary transport industries; industries of travel agencies	8.4	4.7	21.6	15.5	36.4	28.6	170.0	94.1	1,511	1,865
I	64	Post and telecommunications	99.7	39.3	100.0	91.7	100.0	97.1	9,933.9	2,586.0	7	154
J	65	Financial intermediation, except insurance and pension funding	49.4	12.9	98.3	44.6	99.7	74.9	3,840.2	682.3	20	321
J	67	Industries auxiliary to	11.8	7.8	39.4	23.7	59.2	40.2	486.6	208.8	306	405

		financial intermediation										
K	70	Real estate industries	32.9	26.2	76.6	37.2	90.0	45.0	2,105.1	757.8	112	3,986
K	71	Renting of machinery and equipment without operator and of personal and household goods	18.9	20.5	48.4	36.8	68.8	51.7	754.0	565.3	193	925
K	72	Computer and related industries	4.0	10.2	11.9	18.5	22.1	29.1	60.5	148.6	1,099	1,751
K	73	Research and development	16.0	34.3	44.3	66.1	63.0	82.7	629.9	1759.2	211	171
K	74	Other business industries	3.9	2.4	10.9	7.7	17.5	14.2	40.8	23.6	7,127	10,358
L	75	Public administration and defence; compulsory social security	92.1	32.6	100.0	95.0	100.0	98.6	8,551.9	2,208.1	2	19
M	80	Education	10.2	4.5	26.6	13.0	39.6	21.8	242.4	68.3	397	734
N	85	Health and social work	17.6	6.1	42.2	14.7	59.6	23.7	663.4	85.4	138	808
O	90	Sewage and refuse disposal, sanitation and similar industries	22.9	4.6	46.2	16.9	65.9	33.7	798.6	145.7	73	182
O	91	Industries of membership organizations n.e.c.	73.6	23.2	97.9	63.4	99.9	89.3	5,889.6	1,339.9	14	37
O	92	Recreational, cultural and sporting industries	48.1	25.4	66.4	44.4	74.3	57.8	2,477.0	800.7	572	1,017
O	93	Other services	11.1	3.7	32.6	13.1	50.5	26.2	354.0	77.4	328	1,035
Q	99	Extraterritorial organizations and bodies	25.6	-	57.7	-	78.3	-	1,105.8	-	221	

Leading industrial firms (C1 ratio) increased their relative share in 24 out of 57 observed divisions. The greatest increases were reported in manufacturing industries. Namely, Manufacture of wearing apparel; dressing and dyeing of fur; Tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear; Manufacture of office machinery and computers; and Manufacture of electrical machinery and apparatus n.e.c.. Significant growth in the share of the leading firm was marked in the industry of Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods; Computer and related services, as well as Research and Development services.

The share of four leading firms measured by C4 ratio mainly moves in the same direction as the share of the leading firm. The exception is Manufacture of radio, television and communication equipment and apparatus, where the share of the leading firm fell, and the share of four leading firms increased. The same trend is observed in Construction.

Shifts in the HHI mostly accompany shifts in C1 and C4 ratios because in this indicator squaring the shares increases the influence of leading firms' markets shares on its value. However, the shifts in the shares of ten leading firms measured by C10 ratio in 16 divisions do not follow the movements of the share of the leading firm and four biggest firms (see changes in C1, C4 and C10 in tables in the Appendix).

Table 2. Shifts in the HHI across divisions of the Croatian economy (1995-2006)

Industry	Division	HHI											
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006.
A	1	145.1	141.6	128.7	159.9	188.3	193.5	225.0	132.7	198.0	194.7	263.7	218.8
A	2	9,546.6	9,487.3	9,040.5	8,124.5	8,600.8	9,164.3	9,579.9	9,065.5	9,455.0	9,490.0	9,400.7	8,713.5
B	5	861.5	1,227.4	1,354.4	942.3	585.2	469.2	754.3	913.4	748.4	517.8	807.3	446.1
C	11	-	9,962.4	6,451.0	5,297.1	4,607.2	4,388.9	5,252.5	3,647.5	3,340.2	2,699.3	2,525.2	2,337.6
C	12	-	-	-	-	-	-	-	-	-	10,000.0	10,000.0	9,122.6
C	13	-	10,000.0	10,000.0	10,000.0	10,000.0	10,000.0	10,000.0	6,048.4	5,001.6	5,010.4	10,000.0	9,871.2
C	14	610.0	640.2	684.8	707.4	1,072.1	1,135.7	331.8	305.3	335.9	309.5	287.2	224.4

D	15	288.7	221.0	194.1	215.6	243.2	234.2	231.7	232.7	222.1	232.3	225.0	182.1
D	16	3,454.8	4,047.8	3,732.0	3,926.5	4,671.4	5,262.6	5,716.0	6,350.4	7,324.1	5,799.6	8,341.0	7,987.3
D	17	276.1	363.0	336.8	299.3	283.5	299.2	278.9	295.5	253.4	252.5	288.8	263.3
D	18	241.7	296.7	344.2	330.1	448.5	572.6	561.4	885.4	898.2	958.8	1,163.3	691.0
D	19	440.1	362.9	346.0	400.5	378.1	402.0	364.3	386.7	424.5	1,693.5	2,634.1	2,511.4
D	20	86.2	70.4	70.4	69.6	75.7	73.9	80.1	68.7	71.2	85.3	94.5	89.9
D	21	1,254.9	900.0	921.0	825.9	906.5	1,269.4	1,173.0	1,288.4	1,254.0	1,248.8	1,392.5	1,199.6
D	22	312.2	260.7	252.8	197.5	232.9	255.3	256.9	233.6	227.1	259.2	225.4	196.3
D	23	10,000.0	10,000.0	10,000.0	9,999.9	9,999.6	9,991.5	9,992.9	9,277.2	9,229.2	9,138.2	9,264.0	9,226.6
D	24	1,519.3	1,538.6	1,589.6	1,700.0	1,998.6	2,058.6	1,834.2	2,970.7	1,346.1	1,206.4	1,262.4	1,181.7
D	25	243.6	254.7	268.0	444.6	586.5	694.6	957.8	203.2	201.4	176.0	212.4	219.6
D	26	349.9	267.6	268.0	320.1	332.8	377.3	450.3	349.2	343.9	297.8	276.0	244.5
D	27	941.6	941.0	853.5	974.0	1,081.7	1,051.4	849.2	1,837.7	1,162.6	1,203.0	1,381.3	1,235.1
D	28	54.3	55.5	76.1	88.0	81.3	75.5	63.3	50.9	47.7	59.9	56.4	58.1
D	29	133.1	208.3	153.2	122.9	283.3	277.2	173.4	147.8	120.7	147.1	161.1	167.1
D	30	170.6	145.2	177.1	223.5	356.5	543.0	585.0	983.4	974.2	1,163.9	1,452.7	1,684.3
D	31	546.3	454.7	383.0	471.2	615.7	760.7	1,054.2	924.4	500.0	692.9	680.6	744.1
D	32	5,345.6	5,672.9	5,670.6	5,481.7	5,446.1	5,365.3	4,232.3	4,429.8	4,532.2	4,754.7	4,010.7	3,733.4
D	33	253.5	204.0	199.1	246.3	202.7	236.2	214.5	212.1	234.7	314.0	281.2	298.3
D	34	1,181.9	1,145.2	1,254.9	1,357.2	2,465.5	1,724.9	3,014.1	2,241.4	1,657.2	1,770.3	2,359.1	1,778.2
D	35	888.1	1,262.2	869.5	1,031.1	1,071.9	1,641.6	1,349.8	2,105.1	1,379.4	1,195.6	1,246.9	1,147.5
D	36	291.1	280.2	355.9	365.7	364.3	353.9	270.2	265.1	286.5	254.6	223.0	198.2
D	37	659.5	767.1	674.3	890.9	1,002.8	877.5	921.4	1,002.4	915.2	1,016.9	771.0	903.2
E	40	7,838.8	7,697.6	7,430.4	7,358.0	7,148.8	6,723.7	6,156.6	3,527.0	2,578.9	2,618.5	2,734.0	2,751.2
E	41	309.2	529.4	436.6	509.8	446.7	525.8	442.2	431.5	425.9	403.4	421.0	371.9
F	45	70.4	56.5	45.4	46.6	53.6	46.4	78.7	86.3	85.2	70.3	58.7	49.5
G	50	148.7	122.1	205.8	194.6	164.9	211.8	236.4	218.2	182.1	175.7	144.8	197.0
G	51	13.2	12.1	11.3	13.6	12.1	22.6	13.7	18.3	18.2	19.8	21.2	22.3
G	52	81.2	68.2	67.4	46.4	36.0	42.7	78.2	116.7	154.5	225.7	256.5	262.8
H	55	93.3	95.8	82.3	89.7	88.1	93.4	87.2	83.1	72.7	65.1	67.0	60.1
I	60	1,462.4	1,338.5	1,306.8	1,514.0	1,364.0	1,215.2	1,096.1	1,034.7	1,022.3	1,025.8	945.8	803.6
I	61	1,842.2	1,679.3	1,847.8	1,685.6	2,186.0	2,816.6	2,591.0	1,796.4	1,963.4	2,171.4	2,092.3	1,935.0
I	62	9,626.1	9,093.7	9,483.1	9,624.1	9,448.0	9,536.6	9,509.4	9,200.2	8,506.3	7,467.0	6,573.0	6,677.3
I	63	170.0	132.9	132.0	159.4	116.0	140.9	125.2	117.9	116.4	114.8	107.4	94.1
I	64	9,933.9	9,905.5	9,891.2	9,834.5	6,109.3	5,423.3	5,051.3	4,843.1	3,197.9	3,074.5	2,893.1	2,586.0
J	65	3,840.2	5,603.9	2,316.1	1,714.4	199.5	2,297.9	874.3	927.2	1,034.4	845.5	632.2	682.3
J	67	486.6	440.9	412.1	300.6	476.4	165.2	138.4	189.4	154.7	150.2	262.3	208.8
K	70	2,105.1	2,255.6	2,394.8	695.1	1,113.9	350.4	2,560.2	296.2	184.8	246.7	42.3	757.8
K	71	754.0	575.4	698.9	660.0	1,237.0	1,586.7	2,185.2	971.2	786.8	677.8	611.9	565.3
K	72	60.5	59.9	60.1	88.6	57.0	73.3	64.3	101.1	68.5	163.0	156.0	148.6

K	73	629.9	612.6	876.9	1,327.9	1,390.8	1,186.1	1,246.5	1,708.1	1,778.8	1,384.6	1,451.8	1,759.2
K	74	40.8	36.4	28.0	36.4	49.0	32.0	26.8	37.4	57.5	95.5	79.6	23.6
L	75	8,551.9	10,000.0	-	-	10,000.0	10,000.0	2,222.8	2,380.5	2,681.4	2,209.6	2,182.3	2,208.1
M	80	242.4	227.1	224.7	145.0	183.1	201.3	156.6	118.8	152.4	107.3	91.8	68.3
N	85	663.4	481.9	381.0	393.5	289.1	228.6	191.7	154.5	128.5	110.0	102.5	85.4
O	90	798.6	690.6	676.9	677.5	687.3	702.4	769.2	803.4	678.0	641.4	522.6	145.7
O	91	5,889.6	3,123.5	3,212.0	4,324.1	3,606.9	2,302.1	2,778.6	2,112.2	1,926.1	2,025.7	1,490.0	1,339.9
O	92	2,477.0	2,598.8	2,103.6	1,755.1	2,145.2	2,020.8	1,558.2	1,242.2	1,106.7	842.8	742.8	800.7
O	93	354.0	291.9	297.7	304.1	292.0	294.0	277.6	246.0	182.0	158.3	155.1	77.4
Q	99	1,105.8	-	-	-	-	-	-	-	-	-	-	-

Furthermore, divisions with the lowest concentration were analyzed relative to different measures of concentration in 1995 and 2006 (Table 3). For most measures of concentration in both observed years the lowest concentration was registered in division 51- Wholesale trade and commission trade, except of motor vehicles and motorcycles. The only exception is division 74 - Other business industries with the lowest concentration for C10 in 2006. The same division is most often second in rank. As for other divisions, the following divisions appear most often within the divisions with the lowest concentration: 45 - Construction, 28 - Manufacture of fabricated metal products, except machinery and equipment and 72 - Computer and related services.

Table 3. Codes of five divisions with the lowest concentration

	C1		C4		C10		HHI	
	1995	2006	1995	2006	1995	2006	1995	2006
1st rank	51	51	51	51	51	74	51	51
2nd rank	28	74	74	74	74	51	74	74
3rd rank	74	45	28	45	28	45	28	45
4th rank	72	55	72	28	45	80	72	28
5th rank	20	93	45	80	72	28	45	55

The results of analysis of divisions with the highest concentration vary to a much greater extent (Table 4). Division 23 - Manufacture of coke, refined petroleum products and nuclear fuel has the highest concentration for C1 and HHI in 1995, whereas division 13 - Mining of metal ores has the highest concentration relative to C1 and HHI in 2006. Division 75 - Public administration and defense; compulsory social security has the highest concentration for C4 and C10. According to these measures of concentration divisions with the highest concentration in 2006 include 16 - Manufacture of tobacco products and 11 - Extraction of crude petroleum and natural gas; service industries incidental to oil and gas extraction, excluding surveying. Among other divisions in the group of divisions with the highest concentration the following divisions appear most frequently: 64 - Post and telecommunications, 62 - Air transport, 12 - Mining of uranium and thorium ores, and 2 - Forestry, logging, and related service industries.

Table 4. Codes of five divisions with the highest concentration

	C1		C4		C10		HHI	
	1995	2006	1995	2006	1995	2006	1995	2006
1st rank	51	51	51	51	51	74	51	51
2nd rank	28	74	74	74	74	51	74	74
3rd rank	74	45	28	45	28	45	28	45
4th rank	72	55	72	28	45	80	72	28
5th rank	20	93	45	80	72	28	45	55

It can be concluded that divisions with the lowest concentration did not significantly change in 2006 relative to 1995. However, divisions which ranked high in concentration in 1995 most often were not

among the first five in 2006. In other words, industries with low concentration mostly maintained the level of concentration, while industries with high concentration in 1995 reduced the level of concentration in the given period.

Shifts in concentration across divisions

Table 5 contains data on the $\hat{\beta}$ linear trend coefficient and their significance across divisions. The data can be interpreted in the following way: if the linear trend coefficient is statistically significant, column P⁶ shows an arrow which indicates the direction of concentration, and the percentage next to it indicates the level of significance. If the linear trend coefficient is not statistically significant, column P shows the arrow → which indicates that the change in concentration of the division cannot be described with a linear trend.

Table 5. Linear trend coefficients and their significance across divisions

Industry	Code	Industry	C1		C4		C10		HHI		Evaluation of shift
			β	P	β	P	β	P	β	P	
A	1	Agriculture, hunting and related service industries	0.452	↗ 1%	0.681	↗ 1%	0.338	→	8.485	↗ 1%	↗
A	2	Forestry, logging and related service industries	0.033	→	0.051	→	0.002	→	5.822	→	→
B	5	Fishing, fish farming and related service industries	-1.348	↘ 5%	-0.649	↘ 5%	-0.403	→	-48.627	↘ 5%	↘
C	11	Extraction of crude petroleum and natural gas; service industries incidental to oil and gas extraction, excluding surveying	-5.747	↘ 1%	-0.422	↘ 1%	-0.016	↘ 1%	-589.963	↘ 1%	↘
C	12	Mining of uranium and thorium ores	-2.298	↘ 1%	-	-	-	-	-438.679	↘ 1%	↘
C	13	Mining of metal ores	-2.470	→	-	-	-	-	-268.735	→	→
C	14	Other mining and quarrying	-1.388	↘ 5%	-1.757	↘ 5%	-2.107	↘ 1%	-52.473	↘ 5%	↘
D	15	Manufacture of food products and beverages	-0.260	↘ 5%	-0.023	↘ 5%	-0.122	→	-3.042	→	↘
D	16	Manufacture of tobacco products	3.735	↗ 1%	0.636	↗ 1%	-	-	438.629	↗ 1%	↗
D	17	Manufacture of textiles	0.005	→	-0.338	→	-0.514	↘ 5%	-5.638	↘ 5%	↘
D	18	Manufacture of wearing apparel; dressing and dyeing of fur	1.799	↗ 1%	1.988	↗ 1%	1.315	↗ 1%	74.068	↗ 1%	↗
D	19	Tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear	3.411	↗ 1%	3.039	↗ 1%	2.007	↗ 1%	184.494	↗ 1%	↗
D	20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	0.156	↗ 5%	0.222	↗ 5%	0.092	→	1.239	→	↗
D	21	Manufacture of pulp, paper and paper products	0.630	→	0.526	→	-0.018	→	32.546	↗ 5%	↗
D	22	Publishing, printing and reproduction of recorded media	-0.238	↘ 5%	-0.386	↘ 5%	0.095	→	-4.884	→	↘
D	23	Manufacture of coke, refined petroleum products and nuclear fuel	-0.490	↘ 1%	-0.018	↘ 1%	-	-	-95.047	↘ 1%	↘
D	24	Manufacture of chemicals and chemical products	-0.285	→	-0.769	→	-0.408	→	-27.829	→	→
D	25	Manufacture of rubber and plastic products	0.039	→	-0.722	→	-1.424	↘ 5%	-11.858	→	↘
D	26	Manufacture of other non-metallic mineral products	0.138	→	-0.121	→	-0.301	→	-2.220	→	→
D	27	Manufacture of basic metals	0.639	→	1.070	→	0.028	→	44.215	↗ 5%	↗
D	28	Manufacture of fabricated metal products, except machinery and equipment	-0.060	→	-0.152	→	-0.185	→	-1.291	→	→
D	29	Manufacture of machinery and equipment n.e.c.	-0.037	→	-0.098	→	-0.118	→	-2.147	→	→

⁶ P stands for P-value

D	30	Manufacture of office machinery and computers	3.385	↗ 1%	3.912	↗ 1%	3.558	↗ 1%	143.365	↗ 1%	↗
D	31	Manufacture of electrical machinery and apparatus n.e.c.	0.796	→	0.625	→	0.622	→	27.072	→	→
D	32	Manufacture of radio, television and communication equipment and apparatus	-1.430	↘ 1%	0.370	↗ 1%	0.384	↗ 1%	-167.955	↘ 1%	→
D	33	Manufacture of medical, precision and optical instruments, watches and clocks	0.153	→	0.637	→	0.323	→	6.787	↗ 5%	↗
D	34	Manufacture of motor vehicles, trailers and semi-trailers	0.895	→	1.894	→	0.447	→	81.154	→	→
D	35	Manufacture of other transport equipment	0.327	→	0.959	→	0.597	→	33.385	→	→
D	36	Manufacture of furniture, manufacturing n.e.c.	-0.361	→	-0.686	→	-0.537	↘ 5%	-10.567	↘ 5%	↘
D	37	Recycling	0.807	↗ 1%	0.164	↗ 1%	0.017	→	18.452	→	↗
E	40	Electricity, gas, steam and hot water supply	-4.893	↘ 1%	-1.503	↘ 1%	-0.352	↘ 1%	-593.168	↘ 1%	↘
E	41	Collection, purification and distribution of water	-0.036	→	0.103	→	-0.303	→	-3.728	→	→
F	45	Construction	-0.173	↘ 5%	0.074	↗ 5%	0.511	→	1.004	→	→
G	50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	0.075	→	0.321	→	0.123	→	2.259	→	→
G	51	Wholesale trade and commission trade, except of motor vehicles and motorcycles	0.005	→	0.170	→	0.419	↗ 1%	0.957	↗ 1%	↗
G	52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	1.029	↗ 1%	0.901	↗ 1%	1.209	↗ 1%	19.646	↗ 1%	↗
H	55	Hotels and restaurants	-0.160	↘ 1%	-0.302	↘ 1%	-0.399	↘ 1%	-2.976	↘ 1%	↘
I	60	Land transport; transport via pipelines	-0.886	↘ 1%	-1.091	↘ 1%	-0.896	↘ 1%	-57.039	↘ 1%	↘
I	61	Water transport	0.015	→	1.033	→	-0.383	↘ 1%	24.469	→	↘
I	62	Air transport	-1.562	↘ 1%	-0.113	↘ 1%	-0.035	↘ 1%	-264.317	↘ 1%	↘
I	63	Supporting and auxiliary transport industries; industries of travel agencies	-0.222	↘ 5%	-0.414	↘ 5%	-0.517	↘ 1%	-4.926	↘ 1%	↘
I	64	Post and telecommunications	-6.391	↘ 1%	-0.611	↘ 1%	-0.209	↘ 1%	-800.729	↘ 1%	↘
J	65	Financial intermediation, except insurance and pension funding	-3.978	↘ 1%	-4.495	↘ 1%	-1.662	→	-323.137	↘ 1%	↘
J	67	Industries auxiliary to financial intermediation	-0.703	↘ 5%	-1.534	↘ 5%	-1.770	↘ 1%	-28.370	↘ 1%	↘
K	70	Real estate industries	-2.271	→	-5.507	→	-6.017	↘ 1%	-183.814	↘ 5%	↘
K	71	Renting of machinery and equipment without operator and of personal and household goods	0.422	→	-0.632	→	-1.350	→	-5.108	→	→
K	72	Computer and related industries	0.518	↗ 1%	0.726	↗ 1%	0.880	↗ 1%	9.010	↗ 1%	↗
K	73	Research and development	1.058	→	2.418	→	2.287	↗ 1%	93.691	↗ 1%	↗
K	74	Other business industries	0.206	→	0.204	→	0.204	→	2.577	→	→
L	75	Public administration and defence; compulsory social security	-7.481	↘ 1%	-0.683	↘ 1%	-0.251	↘ 1%	-847.094	↘ 1%	↘
M	80	Education	-0.533	↘ 1%	-1.178	↘ 1%	-1.280	↘ 1%	-14.528	↘ 1%	↘
N	85	Health and social work	-1.161	↘ 1%	-2.252	↘ 1%	-3.217	↘ 1%	-46.976	↘ 1%	↘
O	90	Sewage and refuse disposal, sanitation and similar industries	-0.768	→	-1.349	→	-1.576	↘ 5%	-29.806	↘ 5%	↘
O	91	Industries of membership organizations n.e.c.	-2.968	↘ 1%	-3.071	↘ 1%	-0.886	↘ 1%	-311.365	↘ 1%	↘
O	92	Recreational, cultural and sporting industries	-2.395	↘ 1%	-2.469	↘ 1%	-1.574	↘ 1%	-176.157	↘ 1%	↘
O	93	Other services	-0.370	↘ 5%	-1.454	↘ 5%	-2.000	↘ 1%	-21.033	↘ 1%	↘
Q	99	Extraterritorial organizations and bodies ⁷	-	-	-	-	-	-	-	-	-

⁷ Only a small number of firms operated in division 99 - Extraterritorial organizations and bodies in 1995 so it was not possible to calculate a shift in concentration.

On the basis of linear trend parameters evaluated for each division we established the shifts in concentration, which for the needs of this analysis are defined in three modalities: increase in concentration, decrease in concentration and change not describable by a linear trend (Table 6). The shifts in concentration are determined on the basis of statistical significance and positive or negative sign of the $\hat{\beta}$ linear trend coefficient, as described earlier.

Table 6. Number of divisions relative to the shifts in concentration of selected measures of concentration and summary grade

Shift in concentration	C1	C4	C10	HHI	Summary grade
Increase in concentration	9 (16%)	11 (19%)	8 (14%)	12 (21%)	14 (25%)
Decrease in concentration	23 (40%)	20 (36%)	21 (37%)	24 (42%)	27 (47%)
Change not describable by linear trend	24 (42%)	23 (40%)	23 (40%)	20 (35%)	15 (26%)
Insufficient data ⁸	1 (2%)	3 (5%)	5 (9%)	1 (2%)	1 (2%)
Total	57 (100%)	57 (100%)	57 (100%)	57 (100%)	57 (100%)

The number of divisions with increase in concentration ranges from 16% for C10 ratio up to 21% for the HH index.

There is a much bigger number of divisions in which concentration is falling, in which the smallest share (36%) is for C4, and the greatest (42%) for the HH index.

Change in concentration cannot be described by a linear trend in a significant number of divisions. Still, the smallest number of such divisions is obtained when measured by the HH index (35%) and their biggest number is obtained when concentration is measured by C1 (42%).

It can be concluded that divisions cannot be described by a linear trend in approximately two fifths of divisions for concentration ratios C1, C4 and C10, whereas the share of such divisions is approximately one third for the HH index (Figure 2).

On the other hand, the share of divisions in which concentration is rising is less than one tenth when C1 and C1 concentration ratios are used, and approximately one tenth when concentration ratio C4 and the HH index are used.

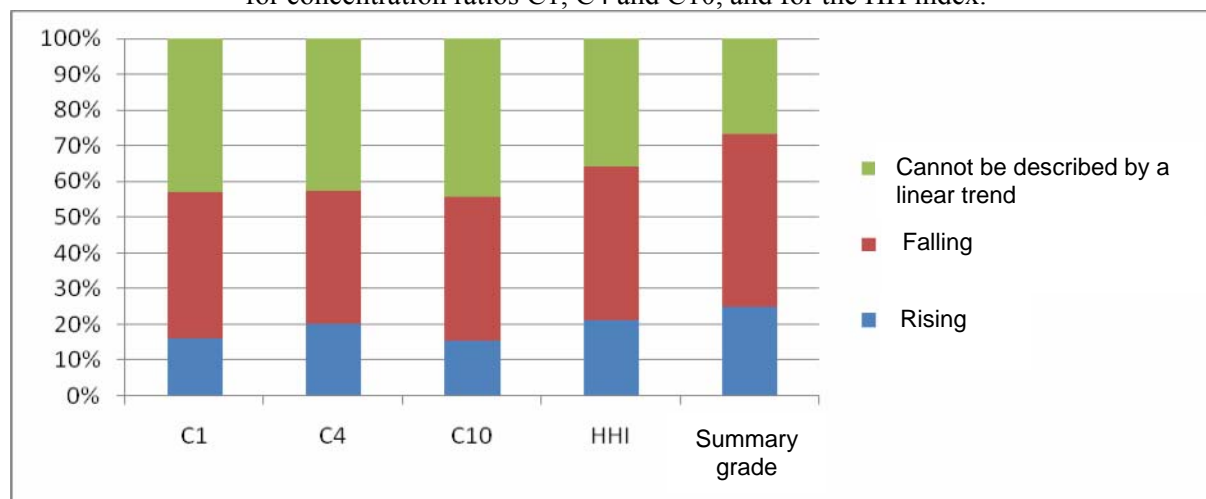
The share of divisions in which concentration is falling is the smallest for C4 and C10 ratios and approximately equals one third, whereas the share of such divisions is approximately two fifths for concentration ratio C1 and the HH index.

The summary grade of shifts in concentration was obtained on the basis of the already described criterion of statistical significance of the $\hat{\beta}$ linear trend coefficient. It is clear that concentration is falling in 47% of divisions, rising in 24% of divisions, while in 29% of divisions the shift cannot be described by a linear trend.⁹

⁸ Shifts in concentration were not established for those measures of concentration for which there is insufficient data. For instance, Division 99 – Services of extraterritorial organizations and bodies contained only several firms in 1995, after which this division contained no data at all because the organizations were either dissolved or they changed industry altogether.

⁹ It can be observed that increase in concentration is present in more divisions summarily than in any other used indicator. This observation which seems illogical at first, is the result of methodology applied for determining the summary grade of concentration according to which shifts in concentration of the division were graded as rising if at least one indicator showed statistically significant increase with the assumption that other indicators showed no statistical significance of the linear trend coefficient.

Figure 2. Structure of divisions relative to shifts in concentration for concentration ratios C1, C4 and C10, and for the HH index.



Furthermore, divisions with the fastest rise or fall in concentration were analyzed relative to the size of the $\hat{\beta}$ linear trend coefficient. Table 7 contains codes of five divisions with the fastest increase and decrease in concentration. It can be observed that different measures of concentration do not contain the same divisions relative to the same criterion. Ratio C1 and the HH index contain almost the same list of divisions in terms of the fastest decrease, but ratios C4 and C10 have only one division in common out of five divisions with the fastest decrease. On the other hand, concentration ratios C4, C10 and the HH index contain almost the same number of divisions in terms of the speediest increase, whereas C1 ratio contains no single division among those with the fastest increase which would also be the fastest relative to any other measure of concentration.

Table 7. Codes of five divisions with the fastest increase and decrease in concentration

	Fastest decrease				Fastest increase			
	C1	C4	C10	HHI	C1	C4	C10	HHI
1st rank	75	65	70	75	18	30	30	16
2nd rank	64	91	85	64	52	19	73	19
3rd rank	11	92	14	40	37	18	19	30
4th rank	40	85	93	11	72	52	18	73
5th rank	65	14	67	12	1	72	52	18

The division which shows the fastest decline, i.e. the highest negative $\hat{\beta}$ linear trend coefficient for C1 and HHI is division 75 – Public administration and defense; compulsory social security. However, the highest negative $\hat{\beta}$ linear trend coefficient for C4 is observed in division 65 – Financial intermediation, except insurance and pension funding, and for C10 in division 70 – Real estate industries. Other divisions in which concentration is falling and which ranked among the first five relative to the size of the negative $\hat{\beta}$ linear trend coefficient include 11 – Extraction of crude petroleum and natural gas; service industries incidental to oil and gas extraction, excluding surveying, 40 – Electricity, gas, steam and hot water supply and 64 – Post and telecommunications.

Division 30 - Manufacture of office machinery and computers shows the fastest increase when concentration is measured by C4 and C10. The highest positive $\hat{\beta}$ linear trend coefficient for C1 is seen in division 18 – Manufacture of wearing apparel; dressing and dyeing of fur, and for the HH index division 16 - Manufacture of tobacco products. Concentration has the fastest increase in divisions 19 – Tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear, 52 – Retail trade,

except of motor vehicles and motorcycles; repair of personal and household goods and 72 – Computer and related industries.

It can be concluded that divisions with the fastest increase and decrease in concentration vary depending on the used measures of concentration. Secondly, the market share of the leading firm, as well as four and ten largest firms mainly moves in the same direction, but not at the same pace.

Change in concentration across industries

Although research conducted in the 1990s revealed a decline in concentration in countries in transition (Newbery and Kattuman, 1992; Uncovsky, 1994), the results of this study so far have shown that concentration does not shift in the same way in all divisions.

The observed two-level divisions are parts of an industry, so the question arises whether there is a connection between being part of the industry and the direction of shift in concentration in the division. Table 8 contains data on the number of divisions per industry relative to the direction of shift in concentration, for concentration ratios C1, C4, C10 and for the HH index respectively. Arrows in the header of the table point to the direction of shift in concentration, so that arrow ↗ marks linear growth of the concentration measure, arrow ↘ marks linear fall of the concentration measure, and arrow → shows that the shift in concentration cannot be described by a linear trend.

Table 8. Number of divisions across industries relative to the direction of shift in concentration¹⁰

Industry code	Industry	No. of divisions per industry	C1			C4			C10			HHI		
			↗	↘	→	↗	↘	→	↗	↘	→	↗	↘	→
A	Agriculture, hunting and forestry	2	1		1	1				2	1	1		
B	Fishing	1	1			1				1		1		
C	Mining and quarrying	4	3	1		2	2		2	2		3	1	
D	Manufacturing	23	6	4	13	7	3	13	4	3	16	7	4	12
E	Electricity, gas and water supply	2	1	1		1	1		1	1		1	1	
F	Construction	1	1			1				1				1
G	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	3	1		2	1		2	2		1	2		1
H	Hotels and restaurants	1	1			1			1			1		
I	Transport, storage and communication	5	4	1		4	1		5			4	1	
J	Financial intermediation	2	2			2			1	1		2		
K	Real estate, renting and business industries	5	1	4		1	4		2	1	2	2	1	2
L	Public administration and defence; compulsory social security	1	1			1			1			1		
M	Education	1	1			1			1			1		
N	Health and social work	1	1			1			1			1		
O	Other community, social and personal service industries	4	3	1		3	1		4			4		
Q	Extraterritorial organizations and bodies	1		1			1			1				1

The aim of this part of the paper is to interpret the results of changes in concentration for respective divisions in the light of transition and transition-related changes. The analysis will be conducted across industries containing individual divisions. The results of our analysis reveal different levels and dynamics of concentration across divisions in the Croatian economy.

Agriculture, hunting and forestry – Before the 1990s agriculture was characterized by the existence of fragmented farms and a large number of agricultural plants. In mid 1990s farms reduced their production due to a lack of interest of young people to work in agriculture, and due to the depopulation of regions

¹⁰ Due to a small number of firms per division it is not possible to calculate all measures of concentration for all divisions. Therefore, for some industries the number of divisions for particular measures of concentration is smaller than the total number of divisions per industry.

which relied on agriculture as their main source of income. Agricultural plants were closed due to poor efficiency. As a result, concentration of the industry grew, except for forestry where a small number of firms remained in business and concentration of the industry was therefore unchanged. In addition, this industry had to deal with a particular problem of mine-fraught areas.

Fishing – Fishing, just like agriculture, is an industry which develops slowly in Croatia despite natural resources. The falling number of caught sea fish as well as outdated fleets and lack of infrastructure are problems typically encountered in fishing. Despite the system of government grants and incentives big firms in this industry were not competitive and were therefore forced to terminate their business activity. On the other hand, a big number of small-scale and medium-scale businesses emerged. As a result, concentration in fishing remained low with a falling trend.

Mining and quarrying – Since the Republic of Croatia is not particularly rich in ores there is only a small number of firms engaged in mining and quarrying. Therefore, this industry cannot be expected to contain a large number of firms. In particular, a really small number of firms deals with the production of uranium and thorium ores and metals, making these divisions highly concentrated although the level of concentration is falling. On the other hand, manufacturing and distribution of crude petroleum and natural gas is a little less concentrated, and the number of firms in this industry is on the rise. A similar situation occurs in the manufacturing of mineral raw materials and quarrying. Since the expansion of quarrying is noticed, an even bigger decline in concentration in this division is to be expected.

Manufacturing – Manufacturing shows a declining trend in Croatia after the 1990s. This is a result, among other things, of the shrunken market, and the inability of privatized firms to adapt to the demands of foreign markets in the process of marketing their products abroad. Concentration in divisions Food products and beverages; Textiles; Publishing, printing and reproduction of recorded media; Manufacture of rubber and plastic products; Manufacture of furniture was falling in the observed period. These are industries of low concentration in which the level of the HHI is at the level lower than 1,000 points, and in which the number of firms in the given period is growing, except in Textiles. Rising concentration is observed in the Manufacture of tobacco products; Manufacture of wearing apparel; dressing and dyeing of fur; Tanning and dressing of leather, manufacture of luggage, handbags, saddler, harness and footwear; Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; Manufacture of pulp, paper and paper products, Manufacture of basic metals, Manufacture of office machinery and computers, and Manufacture of medical, precision and optical instruments, watches and clocks. In the mentioned divisions the number of firms is falling or rising only slightly.

Electricity, gas and water supply – In the division of Electricity, gas and water supply harmonization with the legislation of the European Union triggered the liberalization of the market. In both divisions (40 & 41) the number of firms is growing. Namely, concentration in division Electricity, gas, steam and hot water supply is falling, although it still remains at a high level. On the other hand, concentration of division Collection, purification and distribution of water is at the low level, maintaining more or less the same level in the observed period. In both divisions the market share of the leading firms fell in the observed period, but the market share of leading four and ten firms is more or less constant.

Construction – In the observed period Construction was one of the most propulsive industries in the Republic of Croatia in which firms generated profits above average. Therefore, the fact that the number of firms registered in the field of construction doubled from 1995 to 2006 is not surprising. The market share of the leading firm fell significantly, whereas the market share of the leading four and ten firms remained more or less the same. This industry shows low concentration.

Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods – The number of firms dealing with trade, maintenance and repair of motor vehicles and motorcycles fell in 2006 relative to 1995. The obtained data show that concentration is slightly rising, which is the result of growth of the market share of the leading firm, but also of four and ten leading firms. Wholesale services and trade intermediation services have extremely low concentration, and the market share of the leading firm is

steady at 2% in the observed period. However, the market share of four and ten leading firms in this industry is rising so that concentration of the division rises as well, which is additionally manifested in the reduced number of firms in this division. Retail services are quite affected by globalization which led to a fall in the number of firms in this industry, and an increase in all measures of concentration, which nevertheless remained at the same level.

Hotels and restaurants – Prior to the 1990s hotel complexes owned by the state dominated this industry. After the war years and privatization hotels and restaurants never managed to reach the prewar level of visits. In the last couple of years, the number of small family hotels has been on the rise. Taking these trends into account, the number of firms in this industry doubled, and concentration declined. The share of the leading firm fell from 5.2% in 1995 to 3.7 in 2006, and the same trend is observed according to other indicators of concentration.

Transport, storage and communication – Low concentration is present in divisions of Land transport; Transport via pipelines; Water transport and Supporting and auxiliary transport industries. The results show that concentration was declining in the mentioned divisions in the observed period. Air transport services are highly concentrated: the market share of the leading firm shrank, but the share of four and ten leading firms remained almost the same although the number of firms almost doubled from 17 in 1995 to 30 in 2006. Post and telecommunications were extremely highly concentrated in 1995 when there were only 7 firms in this division. After intense deregulation in 2006, the number of firms increased to 154. The share of the leading firm shrank from 99.7% to 39.3% but the share of four and ten leading firms remained almost the same.

Financial intermediation – Financial intermediation, except insurance and pension funding is characterized by a dramatic decline in concentration with an increase in the number of firms dealing with this activity. Concentration of industries auxiliary to financial intermediation also follows the same trends.

Real-estate, renting and business industries – Real-estate industries; Renting of machinery and equipment; Computer and related services; Public administration and defense and Other business industries are characterized by an increase in the number of firms engaged in these economic activities. However, these are mainly small scale firms so that concentration in the mentioned industries fell only slightly or even rose, which points to consolidation of these industries. Research and development industries were the only industries which showed a dramatic increase in concentration and reduced the number of firms in the division, which is a result of disappearance of big research centers and accompanying large manufacturing firms.

Public administration and defense; compulsory social security – The number of firms increased from 2 firms in 1995 to 19 firms in 2006. The market share of the leading firm fell significantly, but the share of four and ten leading firms did not change significantly.

Education, health and social work – These are industries with low concentration whose concentration is falling additionally due to the increase in private entities providing health services, or an increase in the number of educational programs provided, especially specialist study programs.

Other community, social and personal service industries – The divisions of this industry are characterized by a decrease in concentration which is the result of market deregulation and increase in economic entities engaged in Sewage and refuse disposal, sanitation and similar industries as well as Recreational, cultural and sporting industries.

Relationship between the level of concentration and direction of its change

One of the aims of this paper is to examine whether there is a relationship between the level of concentration and direction of its change. The direction of concentration of a division is determined on the

basis of shifts of all four measures of concentration altogether and can be observed for each division separately in Table 5. Concentration of the division is rated as high if C1 is higher than 20%, C4 higher than 50%, C10 higher than 70% and if the HH index is higher than 1,000 points.

Table 9 has been constructed on the basis of data from Tables 6 and 7. It shows data on the number of divisions relative to the level of concentration and direction of its change. Table 8 contains data on the level of concentration in 1995 and shifts in concentration in the period 1995 to 2006 for each of the observed measures of concentration.

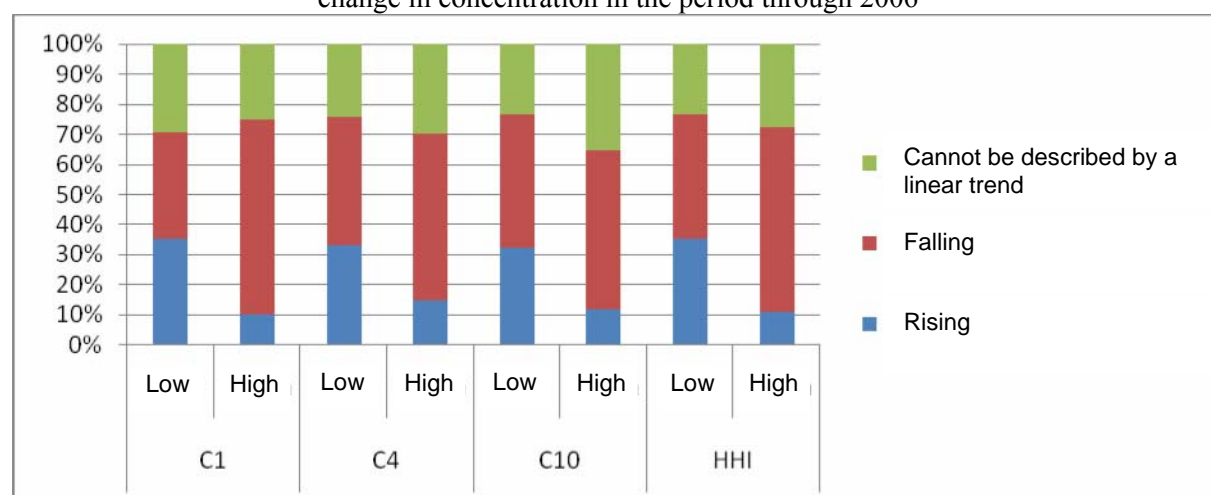
If measure C1 is used, in 1995 there was a total of 34 divisions with low and 20 divisions with high concentration. Out of 34 divisions with low concentration, 12 divisions exhibited a rise in concentration, 13 divisions exhibited a fall and in 10 divisions the movement of concentration cannot be described by a linear trend. On the other hand, out of 20 divisions with high concentration 2 divisions showed an additional rise in concentration, 13 divisions showed a decline in concentration and in 5 divisions the movement cannot be described by a linear trend. It is clear that the share of divisions in which concentration was falling is higher in divisions which had high concentration in 1995 relative to the divisions which had low concentration in the same year.¹¹ The shifts in concentration for other measures of concentration follow the same trend (Fig. 3). This shift might be related to the tendency of the transition economy to transform into the market economy, especially by restructuring and privatization of divisions in which big firms dominated the market due to central planning.

Table 9. Shifts in the movement of concentration measures relative to the level of concentration in 1995¹²

Shifts in concentration from 1995 to 2006	C1		C4		C10		HHI	
	Low	High	Low	High	Low	High	Low	High
Rising	12	2	11	3	11	2	12	2
Falling	12	13	14	11	15	9	14	11
Cannot be described by a linear trend	10	5	8	6	8	6	8	5
Total	34	20	33	20	34	17	34	18
P-value	0.0609*		0.3399		0.2667		0.1641	

*statistically significant with 10% probability

Figure 3. Structure of divisions which had low and high concentration in 1995 relative to subsequent change in concentration in the period through 2006



¹¹ Hi-square test was taken which showed that the difference was statistically significant with 10% of probability for C1 concentration ratio.

¹² The sum of divisions does not equal 57 for all measures of concentration, because firms started doing business in particular divisions after 1995, and for these divisions C1 and HHI were not calculated. Besides, in some divisions there is less than four or ten firms so that C4 and C10 were not calculated for these firms.

5. Conclusion

The study we conducted shows that over the period 1995-2006 industrial concentration was declining in about two fifths of industries in the Croatian economy, while increase in industrial concentration was observed in one fifth of industries. Change in concentration could not be determined for the remaining industries.

We think that it is critically important to stress that the change in concentration in three fifths of divisions observed in this period has different causes. According to us, the most important causes include the following: (1) decrease in concentration due to the inability of leading firms to adjust to transition processes, (2) decrease in concentration due to deregulatory processes, (3) increase in concentration in industries targeted by multinational firms, (4) increase in concentration in industries in which after poorly managed privatization of big firms no new firms of significant market power appeared.

Concentration of particular industries declines due to problems the industry has to face and these problems mainly stem from the inability of leading firms to adjust to transition processes. Such shifts in concentration are manifested in fishing, manufacture of food products and beverages, textiles and furniture. Some industries reduce the level of concentration due to deregulation, for instance water and energy supply, especially gas supply, post and telecommunications, financial intermediation, education, health and social work, sewage and refuse disposal.

More pronounced concentration occurs in a small number of industries as a result of globalization which brought about the entry of multinational firms in the Croatian market. These are mainly fast growing industries in which very high profits (above average) may be made if sophisticated business processes and highly specialized knowledge is used, e.g. computers and related services, retail trade and manufacture of tobacco products. However, in a certain number of divisions within manufacturing, decline in concentration is observed because some leading firms did not implement privatization successfully, and these include industries in which small scale firms cannot produce an acceptable profit margin due to economies of scale, and at the same time these firms are not targeted by multinational firms because of high costs of labor in the Croatian market. For instance, this trend is observable in the manufacture of wearing apparel, rubber and plastic products, basic metals, office machinery and computers, electrical machinery and apparatus.

In addition, the comparison of average values of measures of concentration of all divisions of the Croatian economy in 1995 and 2006 (measures of concentration were weighted with the share of total revenue of all firms in the division in the total revenue of all firms in the Croatian economy in the observed year), shows a slight decline in industrial concentration in the observed period.

Table 10. Weighted mean values of measures of concentration (C1*, C4*, C10* and HHI*) of all divisions of the Croatian economy in 1995 and 2006

Year		C1*	C4*	C10*	HHI*
1995	Mean	19.7	32.3	37.5	1,319.8
	N	54	54	52	54
	Standard deviation	28.2	29.4	28.0	2813,1
2006	Mean	16.6	31.2	37.6	916.3
	N	56	56	52	56
	Standard deviation	21.8	28.1	26.6	2,002.5
Difference in mean values (1995-2006)		-3.1	-1.1	-0.1	-403.5

It is important to say that the results of this study should be considered taking into account the existing limitations. First of all, we used data on total revenue for 10 leading firms only. Since data on the total revenue of all firms together in the division were available, this limitation did not affect the calculation of concentration ratios C1, C4 and C10; it only affected the calculation of the HH index. The second limitation of our analysis stems from the fact that 2-digit divisions of NACE Rev. 1 classification were used because most researchers use 3-digit and 4-digit industry levels. The third limitation is a result of

arbitrarily set limits for concentration ratios C1, C4 and C10 which set apart industries with high concentration from industries with low concentration. The last limitation stems from the fact that only linear trend was used for estimating the direction of shift in concentration.

However, it should be emphasized that these limitations are also present in similar research studies. For instance, concentration on the 2-digit level is calculated by other authors as well (e.g. Sapir, 1996; Lafourcadea et al., 2007). In addition, the approach which uses the calculation of the HH index on the basis of data of n largest firms is quite common in practical measurements of concentration (e.g. U.S. Census Bureau, 2003). The limits for concentration ratios C1, C4 and C10 which set apart industries with low concentration from industries with high concentration were determined on the basis of sample characteristics, but the evaluation of the level of concentration of an industry also used the limit of 1,000 points for the HH index as used by official bodies of numerous states, for instance the Department of Justice of the United States of America (1992). Finally, the visual evaluation of shifts of measures of concentration across divisions whose direction could not be approximated by a linear trend showed that in most cases measures oscillated around average values, without the tendency to move which could be described by some other trend model, such as exponential or parabolic trend.

Regardless of the limitations of this research study, the overview of the state of concentration and shifts in concentration across divisions in the Croatian economy in the past years represents a solid foundation for understanding the structure of individual industries and a basis for further deliberation on expected future shifts in the market.

Increase in industrial concentration is a result of a large number of takeovers and mergers which are characteristic of the global economy in the past few decades. Globalization and concentration trends change the playing field as well as the rules of market competition. World's leading firms grow bigger after merging with their former competitors thus completely changing industrial relations, reducing the number of firms competing in the market and consolidating industrial structures.

Hence, we believe it is possible to come to the conclusion that on the basis of similar experiences of other European countries, concentration of some industries in Croatia will continue to grow. This can also be concluded on the basis of statistical significance of positive linear trends of the industries identified in our study. These industries represent 20% of total industries, primarily agriculture, particular divisions of manufacturing, retail trade and some services.

On the other hand, in around two fifths of divisions concentration is declining, with a falling trend expected in the future as well. Fishing and manufacturing stand out as main examples of such a trend, as well as industries which are marked by deregulation changes, such as utilities and public services.

Further research should focus on determining the relationship between the level of concentration, changes in concentration and various economic variables in the Croatian economy. Similarly, we expect further research to be conducted on the subject of industrial concentration in transition countries since it may reveal possible common features of levels and shifts in industrial concentration. In that respect, special attention should be paid to the impact of the degree of development of a country on the level of concentration. In addition, it is necessary to study concentration and shifts in concentration in new member states of the European Union as well as candidate states.

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Appendix

Table 1. Correlation ratios of C1, C4 and C10 concentration ratios, and the HH index

Year	C1 and C4	C1 and C10	C4 and C10	HHI and C1	HHI and C4	HHI and C10
1995	0.918	0.813	0.961	0.983	0.862	0.736
1996	0.925	0.812	0.957	0.984	0.865	0.732
1997	0.922	0.809	0.962	0.979	0.859	0.715
1998	0.924	0.797	0.962	0.979	0.863	0.710
1999	0.910	0.834	0.973	0.977	0.856	0.750
2000	0.903	0.836	0.973	0.976	0.842	0.740
2001	0.897	0.821	0.977	0.972	0.832	0.728
2002	0.920	0.850	0.980	0.970	0.837	0.734
2003	0.897	0.821	0.977	0.971	0.826	0.701
2004	0.876	0.802	0.977	0.974	0.820	0.711
2005	0.870	0.803	0.974	0.976	0.808	0.723
2006	0.869	0.804	0.976	0.976	0.817	0.728
Mean	0.903	0.817	0.971	0.976	0.841	0.726
Standard deviation	0.021	0.016	0.008	0.004	0.020	0.014

Table 2. Shifts in the number of firms across divisions of the Croatian economy (1995-2006)

Industry	Division	Number of firms											
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
A	1	1,198	1,219	1,250	1,174	1,145	1,121	1,101	1,219	1,314	1,356	1,370	1,594
A	2	50	53	62	59	52	43	46	56	53	52	56	70
B	5	174	188	176	181	179	170	181	199	206	202	210	234
C	11		2	5	5	4	4	5	7	10	12	14	19
C	12										1	1	3
C	13		1	1	1	1	1	1	2	2	2	1	2
C	14	82	93	102	108	118	120	121	144	159	168	187	200
D	15	702	735	799	798	856	867	886	1,034	1,097	1,104	1,121	1,327
D	16	7	8	7	7	8	8	8	7	8	6	5	5
D	17	301	298	292	271	249	246	240	255	275	272	261	275
D	18	560	559	535	502	452	443	431	456	493	469	459	485
D	19	188	194	190	181	167	159	152	160	159	144	135	141
D	20	637	663	690	676	641	626	609	707	722	707	695	763
D	21	146	139	152	148	142	148	156	159	172	163	170	175
D	22	1,398	1,475	1,533	1,489	1,405	1,382	1,357	1,438	1,568	1,519	1,541	1,612
D	23	2	2	3	3	3	3	3	5	8	10	10	11
D	24	245	249	260	255	243	234	226	239	248	244	252	258
D	25	491	511	497	493	481	474	471	517	570	572	569	597
D	26	317	330	347	355	359	364	366	414	441	462	461	542
D	27	84	93	97	88	89	93	81	87	93	99	96	110
D	28	1,281	1,324	1,341	1,307	1,256	1,223	1,198	1,357	1,398	1,392	1,414	1,592
D	29	390	439	457	462	457	459	438	467	502	529	532	569
D	30	363	364	361	335	308	290	274	285	300	301	280	280
D	31	431	426	421	394	371	361	349	361	377	355	350	352
D	32	200	211	198	175	166	155	133	149	162	156	156	149
D	33	238	248	260	240	251	245	245	256	267	269	275	300
D	34	62	62	67	61	57	52	52	60	71	65	61	65
D	35	159	173	193	191	194	198	206	238	259	285	319	360
D	36	460	482	473	449	464	439	455	489	531	536	573	632
D	37	104	108	108	109	101	100	98	116	119	115	123	138
E	40	28	28	34	35	42	44	50	63	65	61	69	81
E	41	80	81	91	92	94	96	98	98	106	108	107	109
F	45	4,579	4,975	5,266	5,261	5,260	5,067	4,944	5,550	6,072	6,415	7,040	8,132
G	50	1,413	1,544	1,637	1,664	1,680	1,699	1,713	2,024	2,214	2,224	2,270	2,406
G	51	20,232	20,882	20,660	18,995	17,730	16,773	15,791	16,925	17,198	16,586	16,309	16,348
G	52	8,760	8,898	8,560	7,889	7,540	7,342	7,066	8,049	8,502	8,234	8,056	8,621
H	55	1,954	2,042	2,067	2,055	2,012	2,019	2,034	2,527	2,768	2,996	3,254	3,817
I	60	1,873	1,910	1,945	1,830	1,771	1,688	1,611	1,784	1,861	1,831	1,834	2,125
I	61	44	48	58	65	65	68	79	106	137	146	167	195
I	62	17	18	21	21	21	22	21	25	26	32	34	30
I	63	1,511	1,545	1,560	1,539	1,489	1,456	1,439	1,548	1,642	1,679	1,722	1,865
I	64	7	11	15	21	28	37	44	63	100	103	131	154
J	65	20	31	66	80	235	218	236	256	266	258	284	321
J	67	306	350	396	425	420	423	379	406	425	416	421	405
K	70	112	149	234	312	350	419	530	800	1,233	1,818	2,718	3,986
K	71	193	221	258	293	282	277	296	408	519	560	775	925
K	72	1,099	1,154	1,173	1,170	1,151	1,163	1,180	1,346	1,471	1,552	1,626	1,751
K	73	211	214	200	179	169	151	147	143	161	166	164	171
K	74	7,127	7,528	7,877	7,702	7,444	7,309	7,229	7,958	8,646	8,996	9,495	10,358
L	75	2	1			1	2	8	12	14	19	21	19
M	80	397	426	454	486	500	501	511	617	669	692	715	734
N	85	138	167	230	274	325	373	412	511	617	664	723	808

O	90	73	81	94	109	104	106	106	120	122	134	148	182
O	91	14	14	12	11	11	7	15	31	41	39	31	37
O	92	572	609	645	651	633	633	655	747	835	886	946	1,017
O	93	328	345	354	368	390	410	425	547	685	781	887	1,035
Q	99	221											

Table 3. Shifts in the share of the leading firm (C1) across divisions of the Croatian economy (1995-2006)

Industry	Division	C1											
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
A	1	6.7	6.0	5.9	6.0	6.6	8.6	10.1	7.4	10.8	10.3	10.1	9.7
A	2	97.7	97.4	95.1	90.1	92.7	95.7	97.9	95.2	97.2	97.4	97.0	93.3
B	5	24.9	32.2	35.1	26.9	17.9	11.7	20.7	23.5	16.7	11.9	23.2	14.3
C	11	-	99.8	77.5	64.6	49.3	53.4	68.3	52.8	49.7	33.2	30.7	29.6
C	12	-	-	-	-	-	-	-	-	-	100.0	100.0	95.4
C	13	-	100.0	100.0	100.0	100.0	100.0	100.0	72.9	50.9	52.3	100.0	99.4
C	14	19.4	19.7	21.7	22.7	30.3	31.4	10.8	11.0	12.0	12.9	10.6	8.3
D	15	13.1	9.7	8.1	7.9	7.9	7.6	8.5	8.4	8.2	8.4	7.9	7.3
D	16	48.8	58.3	53.4	56.9	64.4	70.3	74.1	78.6	84.9	74.4	91.0	88.9
D	17	6.5	9.7	8.9	8.1	7.7	7.6	7.4	8.1	8.8	8.1	8.6	7.7
D	18	8.8	11.3	10.8	14.0	19.1	22.2	18.5	24.5	26.6	27.9	31.1	21.7
D	19	10.7	8.6	8.9	13.0	11.1	12.0	11.2	12.3	10.3	38.6	49.4	48.0
D	20	4.4	3.2	4.0	3.5	3.4	3.3	3.4	3.1	3.9	4.9	5.6	5.7
D	21	31.6	24.2	24.2	21.2	24.0	31.6	30.2	32.2	30.5	30.7	34.5	29.1
D	22	12.3	10.6	9.7	8.8	9.0	8.8	10.1	9.1	8.0	9.9	8.4	8.0
D	23	100.0	100.0	100.0	100.0	100.0	100.0	100.0	96.3	96.0	95.5	96.2	96.0
D	24	28.3	29.1	33.5	36.7	40.9	40.7	37.6	52.5	30.1	27.7	28.0	25.7
D	25	8.0	8.9	10.8	16.6	20.0	22.1	27.6	11.6	10.5	10.2	11.3	12.1
D	26	12.1	8.6	9.0	10.0	12.7	14.1	17.3	12.9	13.5	11.2	10.8	10.5
D	27	19.7	19.0	21.2	23.4	28.5	27.0	20.4	40.0	29.2	26.0	25.0	23.1
D	28	3.7	4.0	3.7	5.2	5.0	3.9	3.5	3.2	3.2	3.6	3.6	3.8
D	29	4.6	9.4	7.6	5.8	13.7	12.2	8.1	6.1	5.3	7.9	7.0	8.0
D	30	6.0	5.4	5.8	8.8	11.2	14.1	19.6	27.7	28.7	31.6	35.8	38.8
D	31	17.9	16.9	12.6	12.3	16.6	21.7	28.6	26.0	17.0	22.3	22.1	22.9
D	32	72.9	75.2	75.2	73.9	73.5	72.9	63.9	65.3	66.4	68.3	61.0	58.2
D	33	8.6	7.3	8.3	10.8	7.6	8.2	8.7	9.0	9.2	10.2	9.2	10.1
D	34	25.4	25.5	28.1	31.1	43.4	30.5	51.4	39.2	30.7	32.7	40.6	32.8
D	35	19.0	27.7	21.2	19.5	22.4	28.0	21.8	40.4	24.8	23.4	23.5	22.8
D	36	8.9	10.5	13.9	15.0	12.1	11.6	9.3	9.5	10.6	9.5	8.3	7.0
D	37	13.4	17.0	15.2	17.9	19.4	17.2	20.7	23.2	20.9	20.7	21.1	24.8
E	40	88.4	87.5	86.0	85.6	84.3	81.7	78.1	57.0	44.5	45.1	46.5	47.1
E	41	8.1	18.5	15.2	18.1	16.5	19.3	16.6	16.3	15.5	14.0	13.1	13.8
F	45	6.4	5.7	4.8	4.4	4.4	4.0	5.0	5.5	5.2	4.4	3.3	3.3
G	50	5.4	7.0	8.7	10.3	10.0	11.5	11.8	9.2	8.2	8.4	7.8	8.1
G	51	2.2	2.0	1.7	1.9	2.0	3.2	2.0	2.2	2.1	2.1	2.0	2.0
G	52	5.8	5.7	5.2	4.3	4.8	4.9	7.2	9.4	11.4	14.0	14.8	14.9
H	55	5.2	5.7	4.8	4.7	4.7	4.5	4.2	4.3	3.9	3.8	3.7	3.7
I	60	36.5	34.7	34.2	37.4	35.1	33.1	31.1	30.3	30.4	30.4	28.5	25.7
I	61	33.8	30.7	33.2	25.8	35.0	46.4	41.9	29.3	33.9	36.8	30.8	30.1
I	62	98.1	95.3	97.4	98.1	97.2	97.6	97.5	95.9	92.1	85.7	80.2	80.4
I	63	8.4	5.9	5.5	8.1	5.2	5.2	5.0	5.6	5.4	5.3	4.9	4.7
I	64	99.7	99.5	99.5	99.2	75.3	70.9	67.6	65.7	48.8	46.3	43.1	39.3
J	65	49.4	72.2	36.7	37.1	10.2	44.3	17.5	23.5	22.4	16.9	12.5	12.9
J	67	11.8	14.3	16.0	11.1	19.1	7.6	6.2	7.3	6.7	6.8	10.7	7.8
K	70	32.9	38.2	46.4	16.7	29.0	13.8	49.8	14.2	11.1	14.4	3.1	26.2
K	71	18.9	15.4	18.7	15.7	27.1	29.2	40.3	20.9	22.0	22.2	21.4	20.5
K	72	4.0	4.1	5.1	7.2	4.8	6.2	5.4	6.4	4.5	10.4	9.9	10.2
K	73	16.0	19.3	26.6	34.4	34.9	29.7	30.2	38.6	39.8	26.6	26.3	34.3
K	74	3.9	3.7	3.0	4.1	3.5	2.9	3.4	4.5	6.1	7.1	7.4	2.4
L	75	92.1	100.0	-	-	100.0	100.0	31.4	34.8	40.9	34.6	31.2	32.6
M	80	10.2	10.1	11.1	8.5	10.5	10.1	8.2	7.4	6.9	6.3	6.1	4.5
N	85	17.6	18.1	14.3	16.7	13.6	12.8	11.0	8.8	8.3	7.3	7.0	6.1

O	90	22.9	20.6	21.3	21.7	22.7	22.7	23.5	24.4	21.7	20.4	18.6	4.6
O	91	73.6	42.1	40.4	58.1	43.0	30.4	36.0	38.3	36.1	35.0	26.8	23.2
O	92	48.1	49.5	44.2	39.5	44.5	43.4	37.4	32.9	30.8	26.5	24.3	25.4
O	93	11.1	10.0	11.0	10.8	10.2	10.4	10.8	11.3	9.2	9.1	9.1	3.7
Q	99	25.6	-	-	-	-	-	-	-	-	-	-	-

Table 4. Shifts in the shares of four leading firms (C4)
across divisions of the Croatian economy (1995-2006)

Industry	Division	C4											
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
A	1	19.2	19.5	18.0	20.1	23.3	23.8	25.5	18.5	23.1	23.4	28.9	25.6
A	2	98.4	98.2	96.5	94.6	96.6	97.8	98.8	98.1	98.6	98.6	98.2	96.0
B	5	46.1	52.6	50.0	48.2	43.1	39.0	46.6	52.6	48.9	40.8	46.3	36.7
C	11	-	100.0	100.0	100.0	100.0	100.0	100.0	98.8	98.3	97.7	97.8	94.7
C	12	-	-	-	-	-	-	-	-	-	-	100.0	100.0
C	13	-	-	-	-	-	-	-	-	100.0	100.0	-	100.0
C	14	37.8	38.4	39.6	40.3	46.6	47.6	30.0	27.3	28.4	27.0	26.2	22.3
D	15	27.0	24.1	22.3	23.9	26.4	26.0	26.2	26.0	25.4	25.9	25.6	22.4
D	16	94.3	94.4	94.2	95.9	95.9	97.4	96.0	98.9	99.9	100.0	100.0	100.0
D	17	25.6	29.4	30.0	27.7	27.0	27.7	24.7	27.0	23.8	24.5	26.6	24.7
D	18	26.8	29.4	32.8	29.1	30.6	34.0	37.9	45.7	44.8	46.0	49.4	42.1
D	19	36.4	30.7	29.6	33.1	31.9	34.3	32.9	32.3	35.0	57.2	67.5	66.9
D	20	13.9	11.4	11.9	11.4	12.7	12.0	12.4	11.3	12.2	14.2	15.1	15.2
D	21	53.2	48.0	51.1	48.3	49.6	54.9	51.4	54.4	56.2	55.7	53.9	54.4
D	22	31.3	28.9	28.8	25.2	26.0	28.4	28.3	26.8	26.9	28.4	25.5	23.3
D	23	100.0	100.0	100.0	100.0	100.0	-	-	-	100.0	99.6	99.9	99.9
D	24	69.5	69.6	66.8	65.5	68.7	71.8	68.8	75.2	62.7	59.7	61.3	60.6
D	25	23.6	25.5	27.1	35.1	40.3	43.7	46.3	22.0	23.1	20.5	22.7	21.5
D	26	32.2	28.1	28.9	32.5	31.1	33.3	34.6	32.3	32.2	30.4	29.2	26.9
D	27	51.2	53.0	48.9	50.3	48.8	50.1	50.8	63.3	54.9	58.6	61.4	59.9
D	28	11.2	11.3	14.0	16.3	15.5	14.6	12.7	11.3	11.1	12.0	11.6	12.0
D	29	17.3	24.4	20.5	17.2	26.2	27.9	22.6	19.9	17.8	19.9	20.3	20.3
D	30	19.4	17.2	20.4	23.6	32.9	43.2	39.6	49.1	45.5	49.7	54.9	57.5
D	31	40.3	34.0	32.6	37.9	43.7	46.4	51.2	49.9	38.1	41.0	41.0	43.2
D	32	81.1	82.4	80.5	80.7	82.5	83.8	84.3	85.3	83.1	83.9	84.4	85.1
D	33	26.3	23.2	22.2	24.6	23.3	26.1	24.2	24.3	25.7	31.1	29.2	31.6
D	34	58.8	54.9	58.9	59.1	80.6	70.7	83.3	83.9	74.4	73.0	78.1	71.1
D	35	53.9	63.7	52.8	56.5	56.9	75.3	69.9	73.5	68.2	62.1	65.5	62.0
D	36	30.1	29.5	32.4	32.0	34.4	32.7	28.8	27.5	28.0	26.8	25.2	23.4
D	37	47.3	51.0	45.0	54.5	59.2	55.1	55.3	55.7	54.8	57.6	46.0	48.4
E	40	94.9	95.2	94.2	93.8	92.7	92.1	90.6	83.2	81.9	81.4	82.8	82.3
E	41	26.6	35.2	32.5	34.3	31.8	33.9	32.5	31.2	32.7	32.8	34.1	30.9
F	45	13.2	12.1	11.1	11.1	12.2	11.2	14.8	14.8	14.8	13.5	12.0	11.0
G	50	20.2	17.8	24.9	22.6	20.4	24.0	26.1	26.4	23.8	23.1	20.2	25.3
G	51	6.0	5.6	5.2	5.7	5.4	7.9	5.7	6.8	6.8	7.1	7.1	7.2
G	52	15.9	14.9	15.0	11.3	8.7	10.2	13.7	16.4	17.8	21.1	22.8	23.6
H	55	16.3	16.7	15.3	15.5	14.9	15.0	14.5	14.7	13.7	13.1	13.7	13.3
I	60	54.1	52.7	51.8	52.7	52.0	49.2	47.6	46.2	44.6	45.1	45.9	41.0
I	61	70.4	70.1	72.5	74.4	87.0	89.2	89.8	76.9	78.6	83.0	83.5	80.4
I	62	99.8	99.5	99.6	99.8	99.4	99.3	99.2	99.0	98.9	98.9	98.6	98.6
I	63	21.6	19.0	18.7	21.4	18.3	19.4	18.1	18.1	18.0	17.6	16.4	15.5
I	64	100.0	100.0	99.9	99.9	99.5	99.4	99.1	98.4	96.6	96.6	95.5	91.7
J	65	98.3	96.5	82.7	65.9	21.8	73.9	55.4	51.0	56.0	49.9	42.6	44.6
J	67	39.4	35.9	33.3	30.1	33.7	20.8	18.7	21.7	20.0	19.2	27.1	23.7
K	70	76.6	78.9	70.1	47.9	53.4	30.2	62.3	27.3	20.4	22.1	9.7	37.2
K	71	48.4	41.3	45.1	44.4	60.0	69.0	72.9	55.5	47.0	40.8	38.5	36.8
K	72	11.9	12.4	11.8	14.5	11.6	13.3	12.1	16.5	13.4	20.0	20.2	18.5
K	73	44.3	42.1	44.4	49.5	53.0	55.3	56.3	59.3	59.2	66.0	67.9	66.1
K	74	10.9	10.3	8.8	10.1	12.1	9.4	8.3	10.0	12.1	16.3	14.5	7.7
L	75	100.0	-	-	-	-	-	94.2	89.2	93.0	91.8	90.1	95.0
M	80	26.6	26.5	26.1	20.1	21.5	22.7	20.6	18.0	s	17.0	15.5	13.0

N	85	42.2	32.7	31.6	29.5	25.6	21.5	21.2	19.7	17.5	16.0	15.6	14.7
O	90	46.2	43.9	42.0	39.9	39.4	39.8	43.1	44.2	41.0	40.0	35.8	16.9
O	91	97.9	93.5	94.4	98.4	96.2	87.9	96.3	80.0	74.0	79.0	68.0	63.4
O	92	66.4	66.3	61.2	60.8	63.7	61.2	56.7	51.8	48.0	42.5	40.8	44.4
O	93	32.6	28.8	28.7	28.8	27.8	27.6	27.0	24.4	21.2	19.6	19.1	13.1
Q	99	57.7	-	-	-	-	-	-	-	-	-	-	-

Table 5. Shifts in the shares of ten leading firms (C10)
across divisions of the Croatian economy (1995-2006)

Industry	Division	C10											
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
A	1	35.1	34.7	33.1	37.3	39.8	36.7	39.2	32.1	35.3	35.9	42.8	38.3
A	2	99.1	99.0	98.1	97.8	98.8	99.3	99.6	99.4	99.5	99.4	99.0	97.4
B	5	66.8	68.3	65.4	61.9	58.4	59.0	67.3	68.9	67.2	61.5	66.1	54.6
C	11	-	-	-	-	-	-	-	-	-	100.0	100.0	100.0
C	12	-	-	-	-	-	-	-	-	-	-	-	-
C	13	-	-	-	-	-	-	-	-	-	-	-	-
C	14	62.0	65.0	62.7	60.9	63.8	64.3	49.2	47.9	50.4	45.4	47.5	43.0
D	15	43.6	41.4	40.3	43.0	44.5	43.7	42.4	42.7	41.8	42.9	42.9	38.8
D	16	-	-	-	-	-	-	-	-	-	-	-	-
D	17	50.2	56.7	54.1	51.3	49.6	51.1	50.4	51.3	46.8	46.9	50.3	48.3
D	18	42.8	45.9	49.0	45.3	44.1	46.1	50.7	57.9	55.8	56.1	58.7	53.1
D	19	57.5	56.4	53.7	54.7	54.9	54.6	51.3	53.4	58.2	73.3	78.7	78.1
D	20	26.7	24.5	24.0	24.3	25.2	25.0	26.2	24.3	24.4	26.0	27.2	25.7
D	21	76.3	73.8	73.9	73.8	73.5	77.4	75.9	74.8	76.5	75.4	73.5	73.7
D	22	43.0	40.6	39.2	37.9	42.3	42.9	42.9	41.8	41.4	43.3	42.3	39.9
D	23	-	-	-	-	-	-	-	-	-	-	-	-
D	24	82.8	83.4	80.9	79.9	83.0	85.3	83.4	86.2	78.1	77.2	78.8	78.4
D	25	46.7	46.7	45.2	49.4	51.1	55.6	57.5	33.7	35.9	33.2	36.8	36.1
D	26	48.2	44.9	44.8	48.0	46.9	49.5	50.3	48.4	46.4	45.6	43.4	41.4
D	27	80.0	81.2	77.4	76.2	74.5	76.4	73.8	79.3	74.7	77.0	82.1	79.8
D	28	21.2	21.3	25.4	25.1	24.6	24.3	22.3	20.0	19.4	22.2	21.8	22.1
D	29	33.8	39.0	33.5	31.0	38.6	40.7	33.5	34.4	30.8	32.2	36.0	35.8
D	30	38.7	35.7	39.0	42.6	51.2	58.1	56.9	65.9	62.2	65.5	70.6	73.0
D	31	57.4	53.1	53.7	58.4	63.4	65.4	68.7	66.2	56.0	60.7	61.1	62.7
D	32	86.9	86.9	86.1	87.4	88.6	89.1	90.3	89.1	88.4	89.5	90.7	90.9
D	33	44.3	39.6	37.5	39.9	38.7	40.9	38.9	37.7	41.0	46.5	44.9	42.6
D	34	84.4	86.9	86.5	85.1	94.8	91.0	92.5	93.3	88.9	88.7	93.2	88.0
D	35	75.2	81.3	71.4	81.4	81.2	88.2	88.5	89.2	83.6	80.7	81.2	81.7
D	36	47.7	44.8	47.0	45.2	49.8	49.6	44.8	44.0	44.7	43.4	42.0	40.5
D	37	67.9	71.2	70.7	75.9	79.1	76.8	75.5	74.8	74.0	75.7	70.0	68.3
E	40	97.9	98.1	97.4	97.2	96.2	95.9	95.5	94.2	94.7	95.0	94.9	94.6
E	41	49.8	54.3	53.6	53.7	51.7	51.7	49.8	49.4	50.2	50.5	52.1	48.1
F	45	21.4	19.2	17.6	19.0	20.5	19.3	25.4	26.9	27.1	24.7	23.0	21.2
G	50	34.7	31.3	37.3	36.9	31.9	35.6	37.4	37.7	35.4	34.9	32.5	37.4
G	51	10.3	10.0	9.9	10.9	10.0	12.6	10.9	12.7	12.7	13.3	14.0	14.4
G	52	23.0	20.8	20.7	17.2	15.2	17.1	21.7	24.1	25.3	29.2	32.2	33.1
H	55	27.3	27.3	25.8	27.4	27.5	28.9	27.8	26.7	25.4	23.7	23.8	22.4
I	60	62.9	61.4	60.5	60.7	60.8	58.4	57.4	55.9	54.7	56.3	56.6	50.4
I	61	98.5	98.0	97.5	97.7	98.1	98.0	97.6	96.8	94.7	95.5	95.3	93.8
I	62	100.0	100.0	100.0	100.0	99.9	99.9	99.9	99.8	99.6	99.7	99.7	99.7
I	63	36.4	33.4	33.9	34.8	31.2	34.7	32.8	31.4	31.2	31.2	30.8	28.6
I	64	100.0	100.0	100.0	100.0	99.9	99.9	99.8	99.5	99.0	98.9	98.4	97.1
J	65	99.7	99.0	94.0	81.9	35.2	80.0	74.1	74.9	82.1	81.5	73.5	74.9
J	67	59.2	55.8	49.5	46.1	46.1	35.1	33.0	39.8	34.7	34.3	43.2	40.2
K	70	90.0	89.6	83.0	68.7	68.3	47.5	72.2	39.9	33.4	32.0	19.4	45.0
K	71	68.8	65.5	66.4	64.3	76.8	82.4	80.6	66.2	61.3	57.7	55.7	51.7
K	72	22.1	21.6	20.3	22.6	20.3	22.0	21.3	26.4	23.3	31.0	30.4	29.1
K	73	63.0	59.3	61.8	68.0	69.4	74.7	73.3	76.9	76.9	82.0	84.8	82.7
K	74	17.5	16.3	14.4	16.1	19.5	16.1	14.2	15.8	17.6	23.0	20.7	14.2
L	75	100.0	100.0	-	-	100.0	100.0	100.0	99.2	98.9	98.0	96.2	98.6
M	80	39.6	37.4	35.8	30.1	32.0	32.5	31.2	27.5	32.3	27.9	25.1	21.8

N	85	59.6	52.8	50.2	46.7	41.1	34.4	32.8	31.3	28.6	26.9	26.0	23.7
O	90	65.9	62.1	59.9	60.9	57.6	59.5	63.1	61.7	59.4	58.2	51.7	33.7
O	91	99.9	99.4	99.8	-	100.0	-	99.3	96.7	93.0	94.2	92.7	89.3
O	92	74.3	73.6	70.5	71.4	72.5	71.7	68.2	64.8	64.9	59.5	58.9	57.8
O	93	50.5	47.3	47.1	48.8	48.8	48.5	45.7	42.1	37.1	33.5	33.1	26.2
Q	99	78.3	-	-	-	-	-	-	-	-	-	-	-